



Blowout Monitor

Public Safety

Oil drilling rigs can pose hazards to human life, property and the environment if they are not properly monitored for possible blowouts. An oil well blowout results from uncontrolled subsurface flows known as "kicks," which are caused by oil, gas or water entering the wellbore and traveling up the well casing to the surface.

A petroleum industry goal is developing a method for predicting a blowout and advising oil rig crews how to correct such a situation. The Drilling Engineering Association (DEA), a cooperative of 11 oil/gas service companies, is funding a project conducted by Tracor Applied Sciences, Austin, Texas for development of a Well Site Advisor (WSA), a PC-based expert system for training oil rig personnel in taking well control actions. With the help of a NASA computer program called CLIPS, Baker Hughes INTEQ, Houston, Texas is developing a Unix-based version of the WSA for use at the rigsite.

Originally developed by Johnson Space Center, CLIPS is a software shell for developing expert systems. It is designed to permit research, development and delivery of artificial intelligence on conventional computers. A collection of rules is set up and, as facts become known, these rules are applied. The versatility and power of CLIPS has made it a valuable research tool for applications such as INTEQ's WSA, which provides the capability to accurately process, predict and interpret well data in a real time mode.

By means of electronic sensors, a kick is tracked as it moves upward in the drilling system. Using mathematical data from the sensors and rules set up by industry experts as part of the DEA project, the embedded CLIPS portion of the WSA attempts to predict whether the kick has the strength to reach the surface and to diagnose the probable cause of the problem when actual conditions do not match predictions.

The accumulated well site data is used by CLIPS to provide a list of probable causes. Then CLIPS starts a diagnostic session of questions and answers to develop more refined calculations of possible situations. The WSA displays the results coupled with the rules of logic CLIPS used to obtain them; **at left**, a drill byte operator is reviewing the results to decide which scenarios best matches a current situation.

CLIPS was provided to INTEQ by COSMIC®, NASA's Computer Software Management and Information Center (see page 128). Located at the University of Georgia (Athens), COSMIC routinely makes available to industrial and other clients government developed computer programs that have secondary utility.

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